17448 - Feb 1, 2005

124
174
254
94
7234
2
5920

Approximate 95% CI for \( p \):
\[
\bar{x} \pm z_{0.975} \cdot \text{SE} \\
\hat{p} \pm 1.96 \cdot \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}
\]

\[
\frac{\hat{p} - 0.50}{0.50(1-0.50)} \pm 1.96 \sqrt{\frac{0.50(1-0.50)}{1007}}
\]

\[
= (0.499, 0.551)
\]

large of plausible values for \( p \) cannot say that a majority of American think war was a mistake.

Sampling distribution

Some examples using simulated data

(1) \( N(51, 0.2) \)

\[ \text{assume } \sigma^2 \text{ known} \]

Later

For \( \mu \)

\[ n \text{ not large} \]

\[ \sigma \text{ not known} \]

\[ \text{but data follow a Normal distribution} \]

\[ Z = \frac{X - \mu}{\sigma \sqrt{n}} \]

not normally distributed.

when \( n \) is small, \( \sigma \) might not be close to

Variability in \( Z \) has 2 sources

- numerator and denominator

- distribution of \( Z \) more spread out

\[ \text{than a normal distribution} \]

\[ T \text{-distribution} \]

When \( X_1, ..., X_n \) iid r.v.'s from a

\[ \text{Normal distribution with mean } \mu \]

\[ T = \frac{X - \mu}{S/\sqrt{n}} \]

has a \( t \)-distribution

with \( n-1 \) degrees of freedom
\[ X \pm t_{\alpha/2, \nu} \frac{s}{\sqrt{n}} \]

- \( t_{\alpha/2, \nu} \) is the critical value of the Student's t-distribution
- \( s \) is the sample standard deviation
- \( n \) is the sample size

- If the data are not normally distributed, use the bootstrap method to approximate the CI.

- For "z" confidence level is close to \( n \rightarrow \infty \) against departures from normality unless \( n \) is small.